Avid Unity™ MediaNetwork

System Overview

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Using This Guide

Congratulations on your purchase of an Avid Unity™ MediaNetwork workgroup or Trilligent™ Cluster. The MediaNetwork workgroup is a high-performance, high-capacity, shared media storage platform for a workgroup of connected MediaNetwork clients. The Trilligent Cluster is a high-performance media-streaming platform that provides high-capacity shared media storage for a maximum of 20 Media Servers.

The documentation describes the features and hardware of all models. Therefore, your system might not contain certain features and hardware that are covered in the documentation.

Who Should Use This Guide

This guide is intended for administrators who manage MediaNetwork workgroups or Trilligent Clusters.

About This Guide

This guide provides a high-level overview of both MediaNetwork workgroups and Trilligent Clusters. It is organized as follows:

- Chapter 1, "MediaNetwork Hardware Overview," describes common hardware, with specific sections for MediaNetwork components and Trilligent Cluster components. This chapter contains information for MediaNetwork workgroup and Trilligent Cluster administrators.
- Chapter 2, "MediaNetwork Workgroup Overview," introduces MediaNetwork architecture, data flow, and storage. This chapter contains information for MediaNetwork workgroup administrators.

- Chapter 3, “Trilligent Cluster Overview,” introduces Trilligent Cluster architecture, data flow, and storage. This chapter contains information for Trilligent Cluster administrators.
- Chapter 4, “MediaNetwork Management Overview,” describes management tasks and tools common to MediaNetwork workgroups and Trilligent Clusters. This chapter contains information for MediaNetwork workgroup and Trilligent Cluster administrators.

Symbols and Conventions

Avid documentation uses the following symbols and conventions:

Symbol or Convention	Meaning or Action
	A note provides important related information, reminders, recommendations, and strong suggestions.
	A caution means that a specific action you take could cause harm to your computer or cause you to lose data.
	A warning describes an action that could cause you physical harm. Follow the guidelines in this document or on the unit itself when handling electrical equipment.
>	This symbol indicates menu commands (and subcommands) in the order you select them. For example, File > Import means to open the File menu and then select the Import command.
▶	This symbol indicates a single-step procedure. Multiple arrows in a list indicate that you perform one of the actions listed.
⌘	This symbol represents the Apple or Command key. Press and hold the Command key and another key to perform a keyboard shortcut.

Symbol or Convention	Meaning or Action
Margin tips	In the margin, you will find tips that help you perform tasks more easily and efficiently.
Italic font	Italic font is used to emphasize certain words and to indicate variables.
`Courier Bold font`	Courier Bold font identifies text that you type.
Click	Quickly press and release the left mouse button (Windows) or the mouse button (Macintosh).
Double-click	Click the left mouse button (Windows) or the mouse button (Macintosh) twice rapidly.
Right-click	Quickly press and release the right mouse button (Windows only).
Drag	Press and hold the left mouse button (Windows) or the mouse button (Macintosh) while you move the mouse.
Ctrl+*key* ⌘+*key*	Press and hold the first key while you press the second key.

If You Need Help

If you have trouble using your MediaNetwork workgroup or Trilligent Cluster:

1. Retry the action, carefully following the instructions given for that task in this guide. It is especially important to check each step of your workflow.
2. Check the release notes supplied with your Avid application for the latest information that might have become available *after* the hardcopy documentation was printed.
3. Check the documentation that came with your Avid application or your hardware for maintenance or hardware-related issues.

4. Visit the online Knowledge Center at www.avid.com/support. Online services are available 24 hours per day, 7 days per week. Search this online Knowledge Center to find answers, to view error messages, to access troubleshooting tips, to download updates, and to read/join online message-board discussions.
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Related Information

MediaNetwork workgroup and Trilligent Cluster administrators should refer to the following documents for more information:

- *Avid Unity MediaNetwork Site Preparation Guide*
- *Avid Unity MediaNetwork File Manager Setup Guide*
- *Avid Unity MediaNetwork File Manager Failover Installation Notes*
- *Avid Unity MediaNetwork Upgrade Notes*
- *Avid Unity MediaNetwork PortServer Setup Guide*
- *Avid Unity MediaNetwork Media Server Setup Guide*
- *Avid Unity MediaNetwork Supported Configurations*
- *Avid Unity MediaNetwork Management Guide*
- *Avid Unity MediaNetwork Troubleshooting Guide*
- *Avid Unity MediaNetwork Macintosh Fibre Channel Client Setup Guide*
- *MediaNetwork Macintosh Fibre Channel Client Quick Start Card*
- *Avid Unity MediaNetwork Windows Fibre Channel Client Setup Guide*
- *MediaNetwork Windows Fibre Channel Client Quick Start Card*
- *MediaNetwork Macintosh Ethernet Client Quick Start Card*
- *Avid Unity MediaNetwork Windows Ethernet Client Setup Guide*
- *MediaNetwork Windows Ethernet Client Quick Start Card*
- *Avid Unity MediaNetwork Release Notes*
- *Avid Unity MediaNetwork LANserver EX Setup Guide*
- *Avid Unity MediaNetwork LANserver Upgrade Notes*
- *Avid Unity MediaNetwork LANserver Release Notes*

Your MediaNetwork workgroup and Trilligent Cluster also have online Help that provides complete information about using the Setup Manager, the Administration Tool, and the Monitor Tool.

Chapter 1

MediaNetwork Hardware Overview

A MediaNetwork workgroup and a Trilligent Cluster use many of the same hardware components, in different ways, to provide shared access to audio and video files. This chapter provides an overview of the MediaNetwork and Trilligent Cluster hardware, including:

- MediaNetwork Hardware Components
- Trilligent Hardware Components
- File Manager and Backup File Manager
- Fibre Channel Adapter Boards
- MEDIASwitches
- MEDIArray II Drive Enclosures
- Keyboard/Monitor/Mouse Assembly (Optional)
- Keyboard/Video/Mouse Switch (Optional)
- Uninterruptible Power Supplies (Optional)
- PortServer and PortServer Pro Systems
- Media Servers
- MediaNetwork Editing Clients
- Load-Balancing and Network-Routing Switches

For more information on the MediaNetwork workgroup, see Chapter 2. For more information on the Trilligent Cluster, see Chapter 3.

MediaNetwork Hardware Components

A MediaNetwork workgroup contains interconnected components, customized to meet the needs of video editing. A typical environment contains:

- One or more standard 19-inch NEMA or EIA storage racks (customer supplied)
- One Windows 2000® system that functions as the File Manager, with a Fibre Channel adapter board
- A second Windows 2000 system that functions as a backup File Manager, with Fibre Channel adapter board (optional)
- One or two MEDIASwitches to connect the File Manager, the storage subsystem, and the Fibre Channel clients
- One or more PortServers or PortServer Pro systems that share workspaces across an Ethernet network
- Up to seven MEDIArray™ II drive enclosures that contain the MEDIArray II drives
- Up to two Media Servers for streaming media to an in-house network or the Internet: one Media Server for RealSystem® Server software and one for Windows Media®
- Services software
- One keyboard/monitor/mouse (KMM) assembly that controls the File Manager, the backup File Manager, any attached PortServer or PortServer Pro systems, or any attached Media Servers (optional)
- One keyboard/video/mouse (KVM) switch to connect the File Manager, the backup File Manager, the PortServer or PortServer Pro systems to the KMM, or the Media Servers (optional)
- Several uninterruptible power supplies (UPSs) to manage power to the File Manager, the storage, the PortServer or PortServer Pro systems, and the Media Servers (optional)
- One client kit for each Fibre Channel client that contains a Fibre Channel adapter board, the client software, and the user documentation
- One client kit for each Ethernet client that contains the client software and the user documentation

Client systems are not supplied as part of the MediaNetwork workgroup. You must purchase them separately.

Trilligent Hardware Components

A Trilligent Cluster contains interconnected components, customized to meet the need for streaming media to an in-house network or the Internet. A typical environment contains:

- One or more standard 19-inch NEMA or EIA storage racks (customer supplied)
- One Windows 2000 system that functions as the File Manager, with a Fibre Channel adapter board
- A second Windows 2000 system that functions as a backup File Manager, with Fibre Channel adapter board (optional)
- One or two MEDIASwitches to connect the File Manager, the storage subsystem, and the Media Servers
- Up to seven MEDIArray II drive enclosures that contain the MEDIArray II drives
- Several Windows® 2000 Servers that function as Media Servers; a Trilligent Cluster can support up to 20 Media Servers without a backup File Manager or up to 18 Media Servers with a backup File Manager
- One keyboard/monitor/mouse (KMM) assembly that controls the File Manager, the backup File Manager, and the Media Servers (optional)
- One keyboard/video/mouse (KVM) switch to connect the File Manager, the backup File Manager, and the Media Servers to the KMM (optional)
- One load-balancing switch and one network-routing switch (For smaller clusters, the load-balancing and network-routing switches might be integrated into one assembly.)
- Several uninterruptible power supplies (UPSs) to manage power to the File Manager, the backup File Manager, the Media Servers, and the storage (optional)

File Manager and Backup File Manager

The File Manager is a rack-mount, dual-processor computer running the Windows NT 4.0 Workstation operating system.

The File Manager maintains the storage location information for the drive set by caching a complete set of file system metadata in memory. To ensure the integrity of this metadata, the File Manager uses error-correcting code (ECC) memory and periodically writes three complete copies of the metadata to multiple drives in the storage subsystem. The metadata is also written to the drive set when the File Manager service is shut down.

In addition to the active File Manager, another computer can be set up as a backup File Manager to provide system redundancy. The backup File Manager automatically picks up for the active File Manager, within 1 to 2 minutes, if it goes offline for any reason.

Fibre Channel Adapter Boards

Each File Manager, PortServer, MediaNetwork Fibre Channel client, and Media Server requires a Fibre Channel adapter board to connect to the Fibre Channel network.

The File Manager's Fibre Channel adapter board allows it to connect to the storage subsystem, access the Fibre Channel drives, and manage and maintain the file system on the drives through the MEDIASwitch.

The client's adapter board allows them to access the storage subsystem and to send messages to the File Manager through the MEDIASwitch.

MEDIASwitches

MEDIASwitches can have either 8 ports or 16 ports, and your MediaNetwork workgroup or Trilligent Cluster can have 1 or 2 switches. The switch allows you to connect the File Manager, several PortServer or PortServer Pro systems, several MediaNetwork Fibre Channel clients or Media Servers, and up to 7 MEDIArray II drive enclosures (either individually or in pairs of daisy-chained enclosures) together.

Each MEDIASwitch isolates its ports, treating each port as an individual Fibre Channel Arbitrated Loop (FC-AL). This isolation localizes loop initialization events (adding or removing clients, or client restarts) to a particular port. This isolation also increases the stability of the Fibre Channel environment.

All the connections and indicators are on the back of the MEDIASwitch. Figure 1 and Figure 2 show the back panel connectors and status indicators for the 8-port and 16-port MEDIASwitches, respectively.

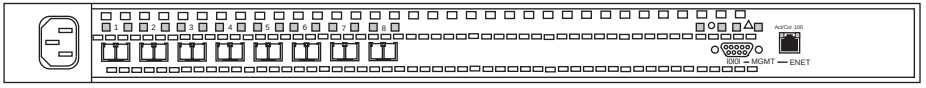

Figure 1 An 8-Port MEDIASwitch

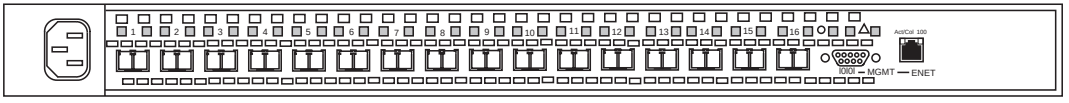

Figure 2 A 16-Port MEDIASwitch

Each MEDIASwitch port uses a small form-factor pluggable (SFP) connector to attach an optical cable to the MEDIASwitch (see Figure 3). The connectors are removable so that you can reconfigure your MEDIASwitch optical cable connections.

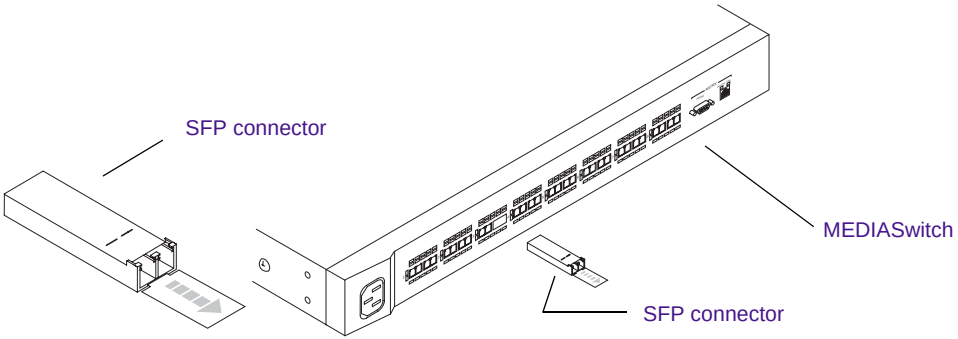

Figure 3 Small Form-factor Pluggable Connector

MEDIArray II Drive Enclosures

The MEDIArray II drive enclosures hold the drives in the MediaNetwork drive set. Each storage subsystem has at least one MEDIArray II drive enclosure. You can connect up to seven MEDIArray II drive enclosures to the MEDIASwitch to expand the capacity of the storage subsystem. Each enclosure contains:

- Up to 14 drives.

You can reserve drives as spares to replace any drives that fail.

- Two loop resiliency and SES (LS) modules. The LS modules are located on the front of the enclosure. The LS modules monitor and control the drive enclosure.
- Two I/O modules with optical low-complexity (LC) connectors. These I/O modules are located on the back of the drive enclosure. They are used to connect the enclosure to the MEDIASwitch or to daisy-chain two drive enclosures.

- Two power supplies. Each power supply can support a fully configured drive enclosure. The two power supplies provide automatic power redundancy should one of the power supplies fail.
- Two cooling modules. Each cooling module can cool a fully configured drive enclosure. The two cooling modules provide automatic cooling redundancy should one of the cooling modules fail.

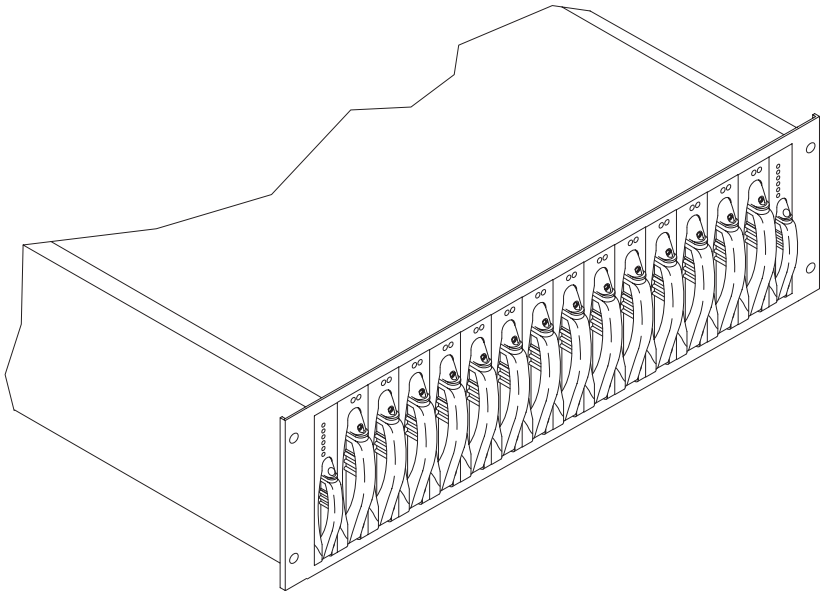

Figure 4 Rack-Mount MEDIArray II Drive Enclosure

Keyboard/Monitor/Mouse Assembly (Optional)

The KMM assembly provides a convenient 1U keyboard, monitor, and mouse that can be rack-mounted to control whichever computer the keyboard/video/mouse switch selects. This assembly eliminates the need for multiple keyboards, monitors, and mouse assemblies, and allows you to save on rack space. For more information, see “Keyboard/Video/Mouse Switch (Optional)” on page 22.

Keyboard/Video/Mouse Switch (Optional)

The KVM switch allows you to control the File Manager and any other computers rack-mounted with the File Manager using one keyboard, monitor, and mouse. You can switch from computer to computer by using the touchpad on the front of the KVM switch or from a keyboard.

Uninterruptible Power Supplies (Optional)

The UPSs provide power protection when there is a brownout, a power dip or spike, or a power outage. They can be configured to shut down the File Manager software and the MediaNetwork storage after approximately 1 minute of power interruption.

Avid recommends that you also use UPSs to protect the clients from potential data loss if a brownout or a power outage occurs. You must purchase these UPSs separately.

PortServer and PortServer Pro Systems

Both PortServer and PortServer Pro workgroups expand the client capacity of your MediaNetwork workgroup by allowing Avid workstations to access MediaNetwork workspaces without a Fibre Channel connection. These clients connect to your MediaNetwork workgroup using an Ethernet connection.

PortServer Systems

The PortServer system connects to the Fibre Channel network. It can mount and share up to 21 workspaces; this number is limited by the number of available drive letters under the Windows 2000 operating system. The workspaces are mounted in alphabetical order. If you have more than 21 workspaces, you can rename them to control which workspaces are mounted. For more information, see the *Avid Unity MediaNetwork PortServer Setup Guide*.

The PortServer system and its clients are connected to each other by an Ethernet network using a switch or a hub. PortServer clients include Windows, Macintosh®, and SGI® nonediting workstations.

PortServer systems support only file copying and file exchange. They are not intended to be used for editing purposes. If you need to do low-resolution editing, set up a PortServer Pro system instead. For more information, see "PortServer Pro Systems" on page 24.

Figure 5 shows a typical PortServer system connected to a MediaNetwork workgroup.

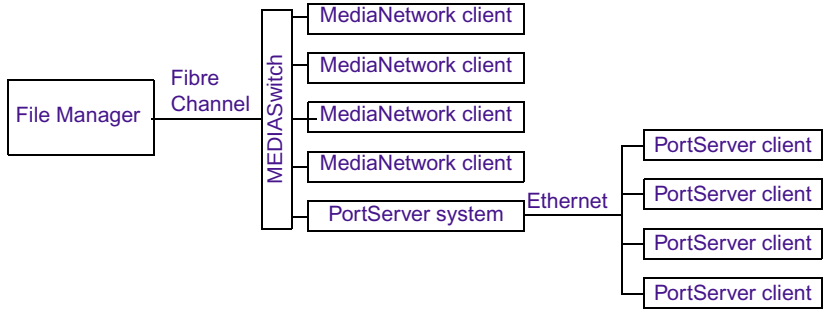

Figure 5 PortServer Workgroup

You can add up to five PortServer systems to your MediaNetwork workgroup, each accommodating multiple PortServer clients. Adding a PortServer system *does* affect your MediaNetwork workgroup's ability to support existing MediaNetwork clients by using a MEDIASwitch port and a MediaNetwork Fibre Channel license.

PortServer Pro Systems

A PortServer Pro system provides all the same features as a PortServer workgroup, with the added benefit of being able to play, record or digitize, and edit DV-50 and other low-resolution media on Windows 2000 or Macintosh workstations.

A PortServer Pro workgroup includes a dedicated Ethernet switch that facilitates the real-time media transfer between the PortServer Pro system and its clients. The Ethernet switch connects to the PortServer Pro system using Gigabit Ethernet and to the PortServer Pro clients using 100BASE-T Ethernet or Gigabit Ethernet.

Figure 6 shows a typical PortServer Pro workgroup connected to a MediaNetwork workgroup.

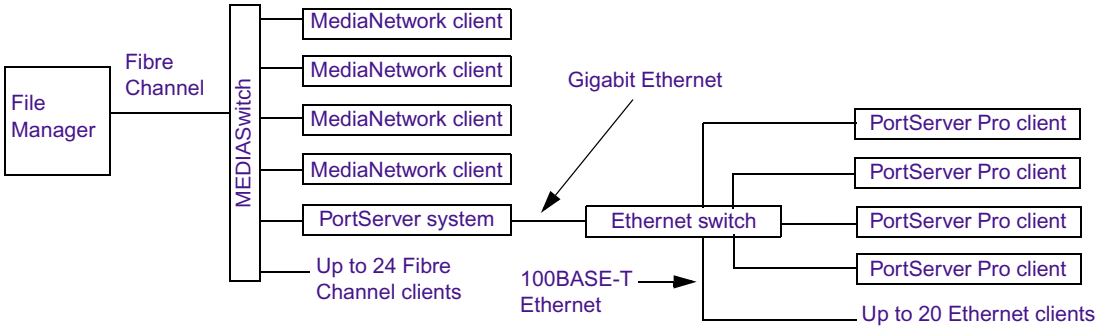

Figure 6 PortServer Pro Workgroup

You can add up to five PortServer Pro systems to your MediaNetwork workgroup, each accommodating multiple PortServer clients. Adding a PortServer system *does not* affect your MediaNetwork workgroup's ability to support existing MediaNetwork clients except that it uses a MEDIASwitch port.

Media Servers

Media Servers are rack-mount, dual-processor computers running the Windows 2000 Server operating system. A MediaNetwork workgroup can support up to 2 Media Servers. A Trilligent Cluster can support up to 20 Media Servers in clusters that without a backup File Manager or up to 18 Media Servers in clusters with a backup File Manager.

Media Servers connect to the network through Gigabit Ethernet. Media Servers connect to the MEDIAswitch through Fibre Channel cables.

MediaNetwork Editing Clients

This section pertains to MediaNetwork workgroups only.

A MediaNetwork workgroup can support up to 24 Fibre Channel editing clients. Clients can be Macintosh, Windows NT, Windows 2000, or Windows XP systems. MediaNetwork clients run a variety of Avid applications, collectively known as the Avid Composer Products software.

Windows Clients

Windows clients can be Avid Composer Products software for Windows NT, Windows 2000, or Windows XP systems including Avid Symphony™, Media Composer®, Film Composer®, Media Station XL, Avid Xpress®, Avid Xpress DV, NewsCutter®, NewsCutter XP, and Digidesign® Pro Tools®.

Macintosh Clients

Macintosh clients have a greater variety of configurations than Windows clients. Each version of Avid Composer Products software has a specific Macintosh configuration that it runs on. These configurations use either a Power Macintosh® 9500, 9600, G3, or G4. Processor speeds and Mac OS® versions are also dictated by the version of Avid Composer Products software you are running.

Avid Composer Products software for Macintosh systems includes Avid Symphony, Media Composer, Film Composer, Avid Xpress, Avid Xpress DV, and Digidesign Pro Tools.

For complete details on the Windows and Macintosh configuration requirements for each version of Avid Composer Products software, see the *Avid Unity MediaNetwork Release Notes* that came with your MediaNetwork workgroup.

PortServer and PortServer Pro System

A PortServer can have any workstation on your in-house network connect to it for file copying and file transfer. You can connect up to four PortServer systems to your MediaNetwork workgroup and mount different workspaces on each PortServer.

A PortServer Pro can support up to 20 Ethernet editing clients. You can connect up to 4 PortServer Pro systems to your MediaNetwork workgroup, and the they can support a maximum of 60 editing clients.

Other MediaNetwork Clients

MediaNetwork workgroups also allow you to attach other clients that provide additional services and functions for the workgroup. Avid Unity MediaManager allows you to search, catalog, and manage the assets currently stored on a MediaNetwork workgroup. Avid Unity TransferManager allows you to package the elements of an Avid sequence and send them to another client system, another MediaNetwork workgroup, or a playback device. Avid ProEncode allows you to off-load file conversions to a separate system when you are converting a file from one format to another (such as from MPEG to QuickTime®).

Load-Balancing and Network-Routing Switches

This section pertains to Trilligent Clusters only.

Most Trilligent Clusters have one or two integrated Gigabit Ethernet layer 2/layer 4 load-balancing switches.

Larger Trilligent Clusters have a Gigabit Ethernet layer 2 network-routing switch and, optionally, a Gigabit Ethernet layer 4 load-balancing switch.

Chapter 2

MediaNetwork Workgroup Overview

This chapter provides an overview of a MediaNetwork workgroup, including:

- MediaNetwork Architecture
- MediaNetwork Data Flow

MediaNetwork Architecture

The components of a MediaNetwork workgroup (see Figure 7) enable multiple MediaNetwork clients to:

- Connect to a set of shared drives (collectively called the *MediaNetwork drive set*).
- Digitize or record, play, and edit video and audio media.

Several editing clients can access the data stored on the MediaNetwork drive set simultaneously.

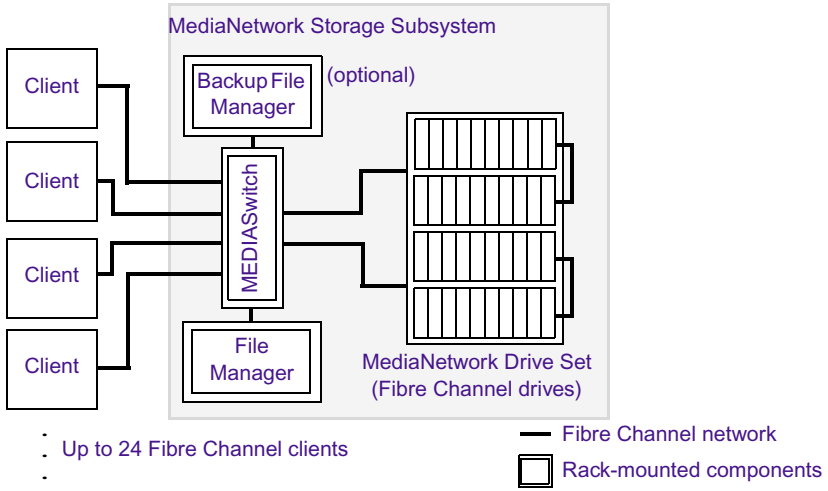

Figure 7 MediaNetwork Architecture

MediaNetwork Storage Subsystem

The MediaNetwork storage subsystem is responsible for storing, retrieving, and managing all data and consists of the following components:

- MEDIASwitch and Fibre Channel network
- File Manager and optional backup File Manager
- MediaNetwork drive set

MEDIASwitch and Fibre Channel Network

The Fibre Channel network is a high-bandwidth network that supports the high throughput required for multiple MediaNetwork editing clients to share video and audio files. It can also support up to two Media Servers to stream video and audio files to your in-house network or the Internet.

The MEDIASwitch is the backbone for the Fibre Channel network. It directs communications among the MediaNetwork clients, Media Servers, File Manager, and MediaNetwork drive set.

File Manager and Backup File Manager

The File Manager or backup File Manager controls all data access to the MediaNetwork drive set. It handles requests from MediaNetwork editing clients and the Media Servers by directing them to the appropriate file locations on the drive set. After the File Manager provides a MediaNetwork editing client or Media Server with a file location, the actual data transfer occurs directly between the client and the storage.

MediaNetwork Drive Set

The MediaNetwork drive set consists of MEDIArray II drives enclosed in one or more rack-mount MEDIArray II drive enclosures. You connect drive enclosures to the MEDIASwitch individually or you daisy-chain them in pairs to reduce the number of connections they require to the switch.

The File Manager handles the MediaNetwork drive set as a single virtual unit, which simplifies storage management. For details on the physical and logical organization of the MediaNetwork drive set, see “MediaNetwork Storage Overview” on page 42.

MediaNetwork Clients

To access data on the drive set, a MediaNetwork client passes a file request to the File Manager. The File Manager returns the requested file’s location information to the client, enabling the client to access the data directly from the drive set. This process avoids a bottleneck at the File Manager while it handles the file transfer, freeing the File Manager to handle file requests from other clients.

MediaNetwork from the User's Perspective

MediaNetwork clients mount workspaces in one of several ways:

- By mapping drives or using the Connection Manager on Windows Fibre Channel clients
- Using the Chooser on Macintosh Fibre Channel clients
- Using the Connection Manager on Windows or Macintosh Ethernet clients

Several MediaNetwork clients can mount the same workspace concurrently. This allows the clients to access the same media and to start using it after the media is written to a workspace.

MediaNetwork Data Flow

Figure 8 traces the data flow from a MediaNetwork editing client request to data retrieval. The following procedure explains the numbered steps in the illustration.

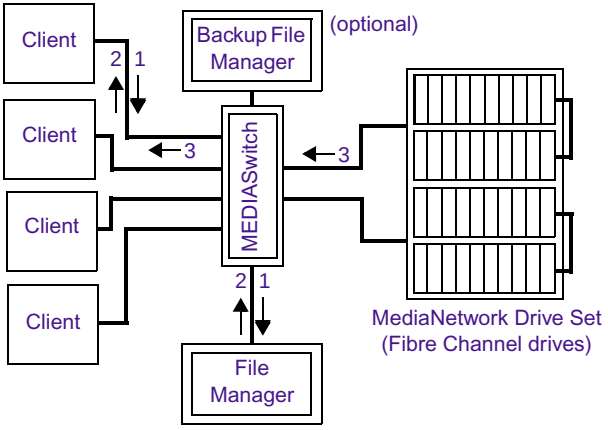

Figure 8 MediaNetwork Client Request Data Flow

The typical MediaNetwork editing client data flow consists of the following steps:

1. The MediaNetwork client issues a request to the File Manager through the MEDIASwitch.
2. The File Manager locates the requested file in its cached copy of the file system metadata and sends the file's location to the MediaNetwork client.
3. Using the location information it received from the File Manager, the client retrieves the data from the drive set through the MEDIASwitch.

All requests and responses between the MediaNetwork editing clients and the File Manager are handled through a messaging mechanism:

- When a client makes a request, the request is stored as a message on the File Manager. The File Manager polls for request messages at regular intervals.
- When the File Manager finds a request, it processes a response and stores it as a message.
- MediaNetwork clients poll for response messages and retrieve the message information accordingly. Unlike the File Manager, MediaNetwork clients poll only when they are expecting responses. The entire process for data retrieval to begin takes less than 1 second.

The Media Servers used in the MediaNetwork workgroup follow the same data flow as those used in a Trilligent Cluster. For information on the Media Server data flow, see "Trilligent Data Flow" on page 39.

Chapter 3

Trilligent Cluster Overview

This chapter provides an overview of Trilligent Clusters, including:

- Trilligent Cluster Architecture
- Trilligent Data Flow

Trilligent Cluster Architecture

The components of a Trilligent Cluster (see Figure 9) enable multiple Media Servers to:

- Receive media requests from the Internet.
- Connect to a set of shared drives (collectively called the *MediaNetwork drive set*).
- Respond to the media requests by reading streaming media from the MediaNetwork drive set in real time.

Several Media Servers can access the data stored on the MediaNetwork drive set simultaneously.

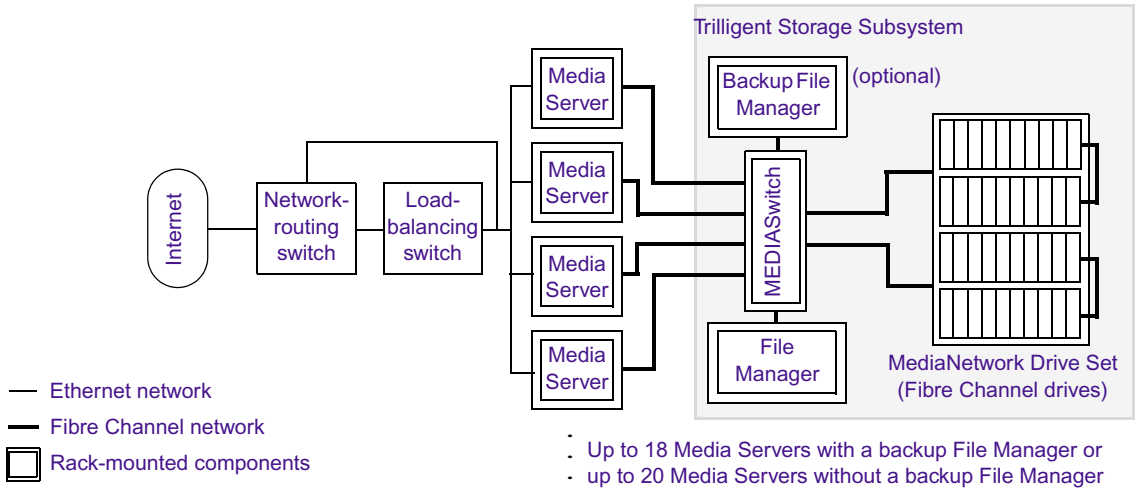

Figure 9 Trilligent Cluster Architecture

Trilligent Storage Subsystem

The Trilligent Cluster uses the MediaNetwork storage subsystem. It is responsible for storing, retrieving, and managing all data and consists of the following components:

- MEDIASwitch and Fibre Channel network
- File Manager and optional backup File Manager
- MediaNetwork drive set

MEDIASwitch and Network

The Fibre Channel network is a high-bandwidth network that supports the high throughput required for multiple Media Servers to stream video and audio files to your in-house network or the Internet.

The MEDIASwitch is the backbone for the Fibre Channel network. It directs requests and responses among the Media Servers, the File Manager, and the MediaNetwork drive set.

File Manager and Backup File Manager

The File Manager or backup File Manager controls all data access to the MediaNetwork drive set. It handles requests from Media Servers by directing them to the appropriate file locations on the drive set.

After the File Manager provides a Media Server with a file location, the actual data transfer occurs directly between the Media Server and the storage. This process avoids creating a bottleneck at the File Manager while it handles the file transfer, freeing it to handle file requests from other clients.

MediaNetwork Drive Set

The MediaNetwork drive set consists of MEDIArray II drives enclosed in one or more rack-mount MEDIArray II drive enclosures. You connect the drive enclosures to the MEDIASwitch individually or you daisy-chain them in pairs to reduce the number of connections to the switch.

The File Manager handles the MediaNetwork drive set as a single virtual unit, which simplifies storage management. For details on the physical and logical organization of the MediaNetwork drive set, see “MediaNetwork Storage Overview” on page 42.

Media Servers

To access data on the drive set, a Media Server passes a file request to the File Manager. The File Manager returns the requested file’s location information to the Media Server, enabling the Media Server to access the data directly from the drive set. This process avoids a bottleneck at the File Manager while it handles the file transfer, freeing the File Manager to handle file requests from other clients.

Network-Routing Switch

The network-routing switch manages traffic between the Internet and the Trilligent Cluster. The network-routing switch is responsible for:

- Receiving media requests from the Internet
- Passing the media requests to the load-balancing switch
- Sending the responses from the Media Servers to the Internet

Some Trilligent Cluster configurations integrate the network-routing switch with the load-balancing switch. Larger configurations often use a standalone network-routing switch.

Load-Balancing Switch

The load-balancing switch receives all media requests, determines which Media Server is the least busy, and passes a request to it. This process balances the workload across all Media Servers.

The load-balancing switch is configured to have a virtual IP address. This is the address that all media requests are directed to, and it simulates having one IP address for all the Media Servers.

Trilligent Storage from the Media Server's Perspective

Media Servers use an initialization file to mount workspaces and control which workspaces mount to which drive letter. Several Media Servers can mount the same workspace concurrently. This allows the Media Servers to access the same media and to start using it immediately after the media is written to a workspace.

Trilligent Data Flow

Figure 10 traces the data flow from an end-user media request to data retrieval. The following procedure explains the numbered steps in the illustration.

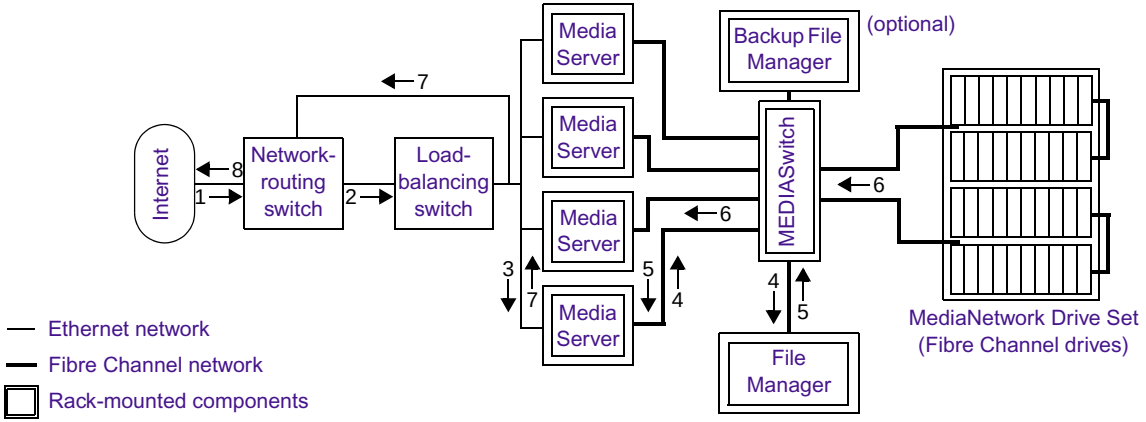

Figure 10 Trilligent Request Data Flow

The typical Media Server data flow consists of the following steps:

1. A system on the Internet sends a media request to a site (IP address or URL) supported by the network-routing switch.
2. The network-routing switch passes the request to the load-balancing switch.
3. The load-balancing switch determines which Media Server is the least busy and passes the media request to it. (In Figure 10, the load-balancing switch passes the request to the bottom Media Server.)
4. The Media Server receives the media request and issues a file request to the File Manager through the MEDIASwitch.
5. The File Manager locates the requested file in its cached copy of the file system metadata and sends the file location information to the Media Server.

6. Using the file location information received from the File Manager, the Media Server retrieves the file from the drive set through the MEDIASwitch.
7. The Media Server sends the requested file to the network-routing switch without involving the load-balancing switch.
8. The network-routing switch sends the requested media to the requesting system on the Internet.

All requests and responses between the Media Servers and the File Manager are handled through a messaging mechanism:

- When a Media Server makes a request, the request is stored as a message on the File Manager. The File Manager polls for request messages at regular intervals.
- When the File Manager finds a request, it processes a response and stores it as a message.
- Media Servers poll for response messages and retrieve the message information accordingly. Unlike the File Manager, Media Servers poll only when they are expecting responses. The entire process for data retrieval to begin takes less than 1 second.

Chapter 4

MediaNetwork Management Overview

Understanding your MediaNetwork storage and how it is configured is part of your management tasks. Several tools help you set up and manage your MediaNetwork workgroup or Trilligent Cluster. This chapter provides an overview of the storage, the tools, and the tasks you perform with them.

Unless otherwise noted, the management tools and tasks discussed in this chapter apply to both MediaNetwork workgroups and Trilligent Clusters.

This chapter provides an overview of administering your environment, including:

- MediaNetwork Storage Overview
- Management Tasks
- Management Tools

MediaNetwork Storage Overview

MediaNetwork simplifies the management of your storage hardware by combining all your physical data drives into a *drive set* that contains a single, large file system.

To use the MediaNetwork file system, you must first assign all data drives in the drive set to *allocation groups* — individually managed file system partitions that span multiple physical drives. Allocation groups must contain a minimum of four data drives that are the same size. You can have several allocation groups to accommodate drives of different sizes, to optimize performance, or to improve data security.

Each allocation group is divided into one or more virtual volumes or *workspaces*. These workspaces function similarly to network drives and can be mounted by MediaNetwork editing clients or Media Servers (the drive set and the allocation groups are transparent to clients). You control access to the workspaces by creating user accounts with read access, read/write access, or no access to each workspace.

You can set workspaces to any size at any time, with the following limitations:

- A workspace cannot be resized to be smaller than 1 GB.
- A workspace cannot be resized to be smaller than the size of the data it currently stores.
- The sum of an allocation group's workspace sizes cannot exceed the size of the allocation group itself.

For information on resizing workspaces, see the *Avid Unity MediaNetwork Management Guide*.

Figure 11 shows the relationship among drive sets, allocation groups, and workspaces.

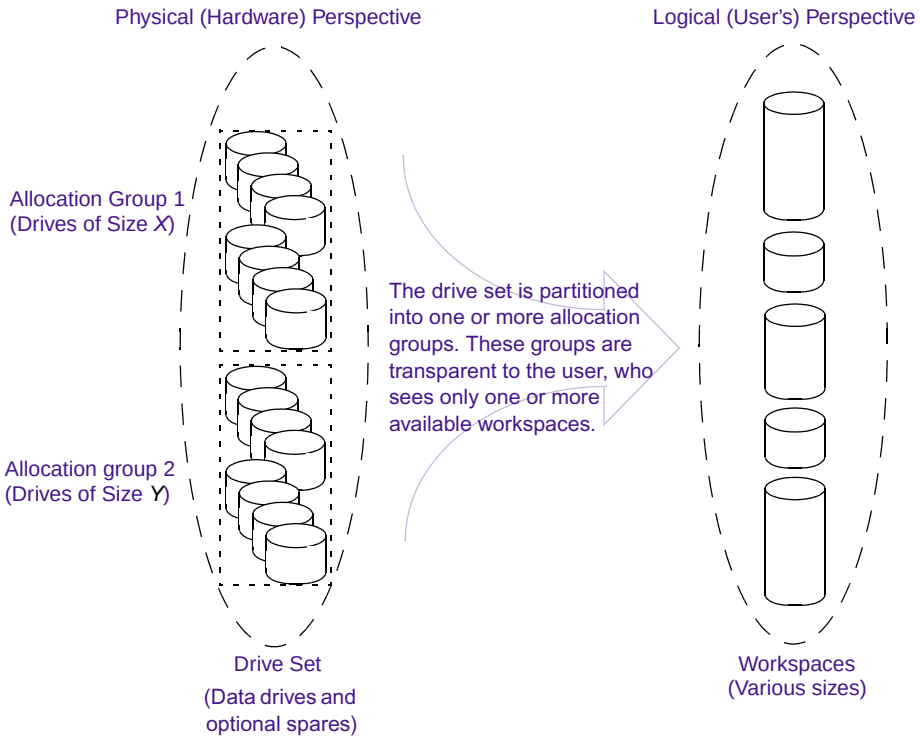
Physical (Hardware) Perspective
Logical (User's) Perspective
Allocation Group 1
(Drives of Size X)
Allocation group 2
(Drives of Size Y)
The drive set is partitioned into one or more allocation groups. These groups are transparent to the user, who sees only one or more available workspaces.
Drive Set
(Data drives and optional spares)
Workspaces
(Various sizes)

Figure 11 MediaNetwork Storage Overview

Protection

You can ensure the data integrity of the MediaNetwork drive set by optionally *protecting* workspaces. When protection is enabled, it creates a duplicate copy of each file that is written to the workspace on another drive.

Protected workspaces can provide improved performance because the MediaNetwork software uses both copies of a file to provide faster file access. They can also be repaired quickly with no data loss if a drive fails.

A protected workspace uses twice as much storage space as an unprotected workspace.

Spare Drives

The MediaNetwork drive set can also include optional spare drives that you can swap for bad data drives if a drive fails. When you replace a failed drive, it appears as a raw drive and must be converted to a spare drive before it can be added to the drive set and an allocation group.

Management Tasks

As an administrator, you are responsible for:

- **Initial setup and configuration** — You must configure the drive set, one or more allocation groups, workspaces, and user accounts before a MediaNetwork workgroup or Trilligent Cluster can be used.

  For more information on initial setup and configuration, see the *Avid Unity MediaNetwork File Manager Setup Guide*.

- **Day-to-day administration** — You need to manage your configuration to accommodate new users and evolving projects (for example, you will have to create, delete, or resize workspaces; create and delete user accounts; and change user account access privileges).

  The MediaNetwork software also provides comprehensive monitoring tools that allow you to check total storage activity on a regular basis as well as that of each connected client.

  For more information on day-to-day management, see the *Avid Unity MediaNetwork Management Guide*.

- **Troubleshooting** — When problems occur with the storage hardware, the File Manager, or a client, you need to diagnose the problem and, if possible, fix it. The MediaNetwork software provides easy-to-understand error messages that inform you of problems in your environment as well as tools that help you to diagnose and fix problems.

  For more information on troubleshooting, see the *Avid Unity MediaNetwork Troubleshooting Guide*.

Management Tools

The MediaNetwork software provides three tools that run on the File Manager, allowing you to set up the hardware and perform day-to-day management tasks. The tools are:

- The Setup Manager
- The Administration Tool
- The Monitor Tool

The following sections provide an overview of each tool.

There are several advanced configuration and troubleshooting tools that you should not need to use unless instructed to do so by Avid Customer Support. For more information, see the Avid Unity MediaNetwork Management Guide.

Setup Manager

You use the Setup Manager to perform storage hardware management tasks, including:

- Creating and managing a drive set
- Specifying drives as data drives, spare drives, or raw drives
- Starting and stopping the File Manager service to perform system maintenance
- Adding drives to and removing drives from the drive set
- Performing drive maintenance and error recovery operations

Figure 12 shows the Setup Manager window. The Setup Manager runs only from the File Manager.

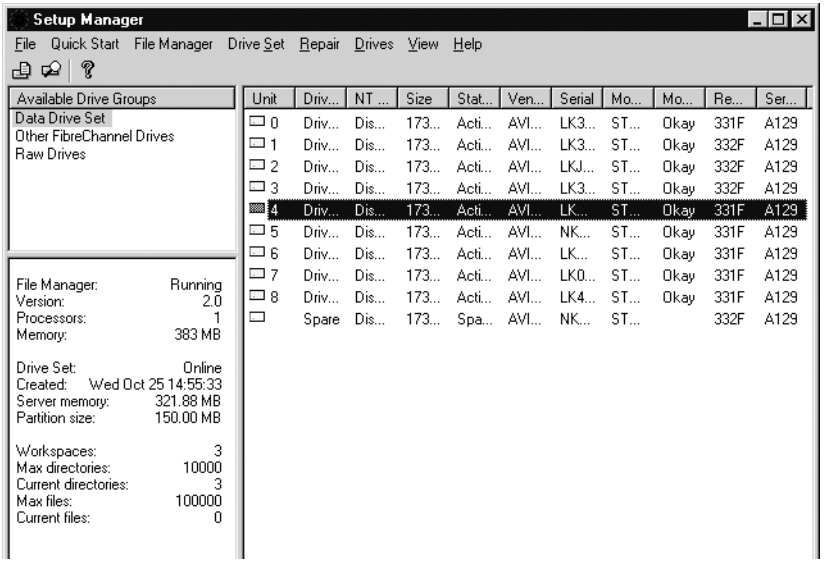
Setup Manager
File Quick Start File Manager Drive Set Repair Drives View Help
Available Drive Groups
Data Drive Set
Other FibreChannel Drives
Raw Drives
File Manager: Running
Version: 2.0
Processors: 1
Memory: 383 MB
Drive Set: Online
Created: Wed Oct 25 14:55:33
Server memory: 321.88 MB
Partition size: 150.00 MB
Workspaces: 3
Max directories: 10000
Current directories: 3
Max files: 100000
Current files: 0
Unit Driv... NT ... Size Stat... Ven... Serial Mo... Mo... Re... Ser...
0 Driv... Dis... 173... Acti... AVI... LK3... ST... Okay 331F A129
1 Driv... Dis... 173... Acti... AVI... LK3... ST... Okay 332F A129
2 Driv... Dis... 173... Acti... AVI... LKJ... ST... Okay 332F A129
3 Driv... Dis... 173... Acti... AVI... LK3... ST... Okay 332F A129
4 Driv... Dis... 173... Acti... AVI... LK... ST... Okay 331F A129
5 Driv... Dis... 173... Acti... AVI... NK... ST... Okay 331F A129
6 Driv... Dis... 173... Acti... AVI... LK... ST... Okay 331F A129
7 Driv... Dis... 173... Acti... AVI... LK0... ST... Okay 331F A129
8 Driv... Dis... 173... Acti... AVI... LK4... ST... Okay 331F A129
Spare Dis... 173... Spa... AVI... NK... ST... 332F A129

Figure 12 Setup Manager

For more information on the Setup Manager, see the *Avid Unity MediaNetwork Management Guide* or select Help > Setup Manager Help.

Administration Tool

The Administration Tool is the primary tool for the initial setup and day-to-day administration. It also allows you to monitor storage usage. You use the Administration Tool to:

- Create, view, rename, and delete allocation groups.
- Add drives to and remove drives from allocation groups.
- Create, view, rename, resize, protect, and delete workspaces.
- Create, view, edit, and delete user accounts (with optional passwords) and assign user access privileges.
- Monitor system usage, including total system bandwidth use, the number of active clients, and the bandwidth consumption of each client.
- View a list of informational, warning, and error messages.

Figure 13 shows the Administration Tool. You can open the Administration Tool on the File Manager, or on any Windows or Macintosh Fibre Channel client (the Administration Tool does not run on Ethernet clients).

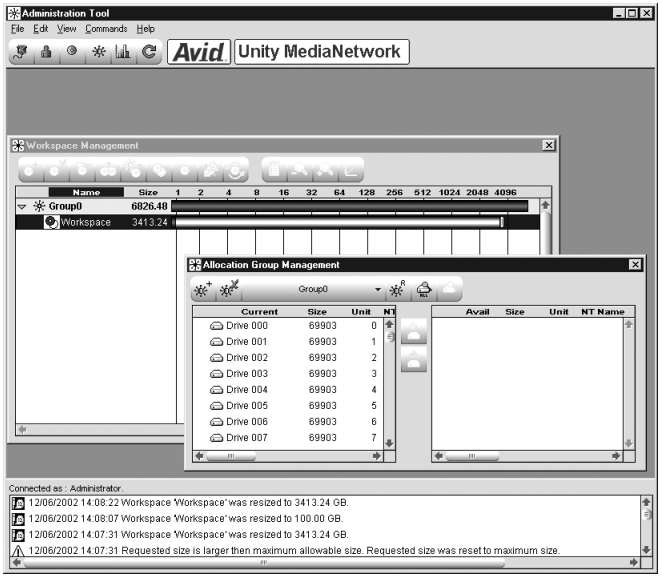
Administration Tool
File Edit View Commands Help
Avid
Unity MediaNetwork
Workspace Management
Name Size 1 2 4 8 16 32 64 128 256 512 1024 2048 4096
Group0 6826.48
Workspace 3413.24
Allocation Group Management
Group0
Current Size Unit NT
Drive 000 69903 0
Drive 001 69903 1
Drive 002 69903 2
Drive 003 69903 3
Drive 004 69903 4
Drive 005 69903 5
Drive 006 69903 6
Drive 007 69903 7
Avail Size Unit NT Name
Connected as : Administrator.
12/06/2002 14:08:22 Workspace 'Workspace' was resized to 3413.24 GB.
12/06/2002 14:08:07 Workspace 'Workspace' was resized to 100.00 GB.
12/06/2002 14:07:31 Workspace 'Workspace' was resized to 3413.24 GB.
12/06/2002 14:07:31 Requested size is larger then maximum allowable size. Requested size was reset to maximum size.

Figure 13 Administration Tool

For more information on the Administration Tool, see the *Avid Unity MediaNetwork Management Guide* or select Help > Administration Tool Help.

Monitor Tool

The Monitor Tool provides low-level performance-monitoring functions. Using the Monitor Tool, you can view:

- The current status of each drive, including its name, number, the amount of available storage, the percentage of storage used, and the number of current files, if any
- A list of the workspaces that exist on the drive set

- The status of communications between the File Manager and the clients
- Information on the metadata maintained by the File Manager
- File Manager memory usage
- Log messages
- Counts and service times for client requests

You can also use the Monitor Tool to start and stop the File Manager software and to set advanced MediaNetwork features, such as resetting the administrator's password.

Figure 14 shows the Monitor Tool. You can open the Monitor Tool only on the File Manager.

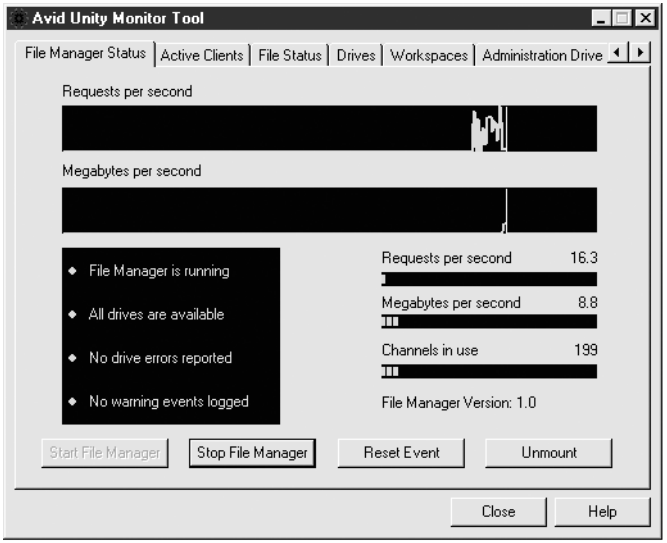

Figure 14 Monitor Tool

For more information on the Monitor Tool, see the *Avid Unity MediaNetwork Management Guide* or select Help > Monitor Tool Help.